

Cell Structures

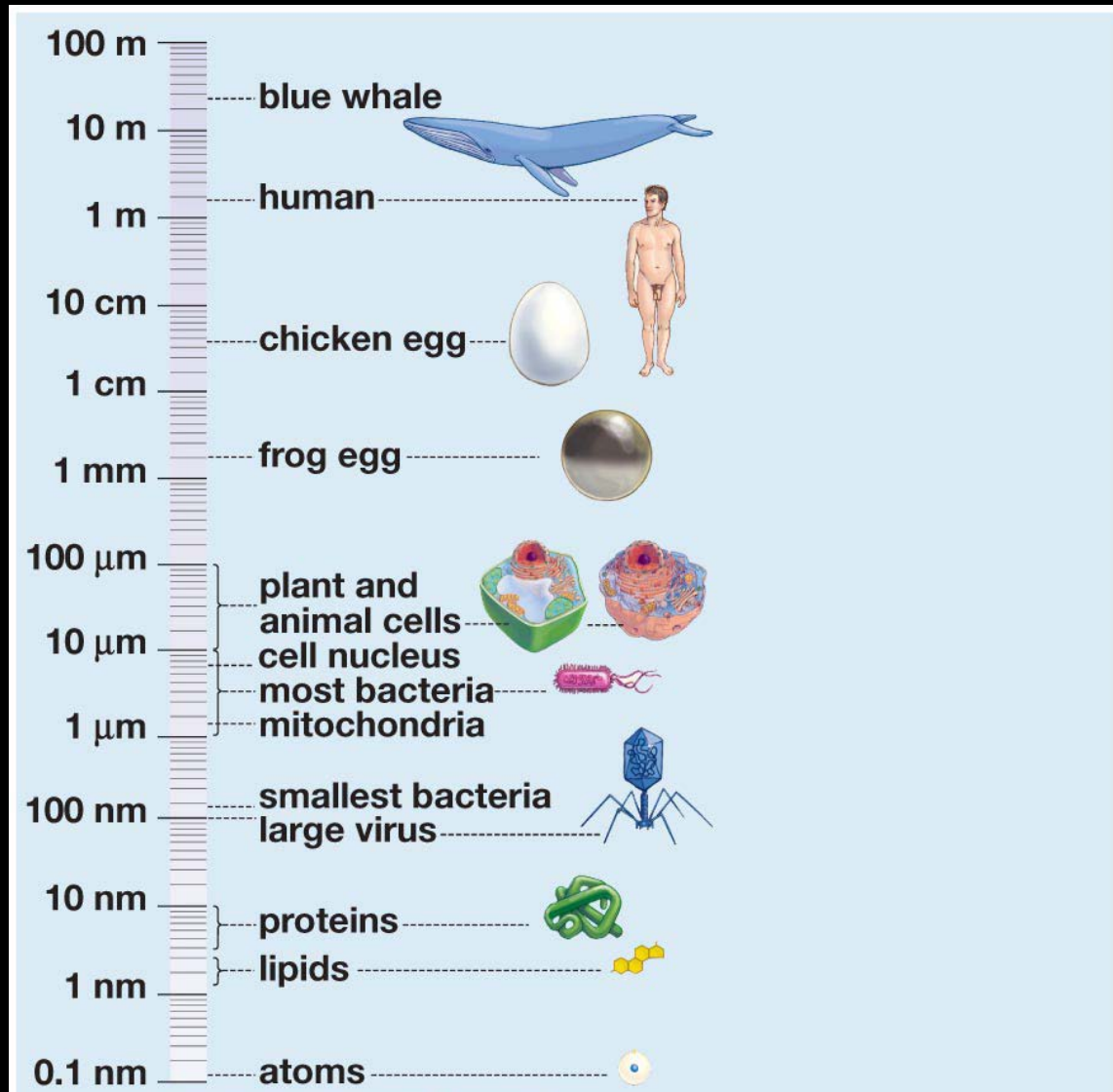
- From Ch. 4

Cell Structures

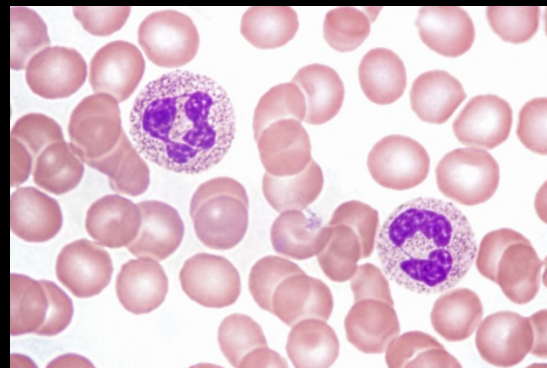
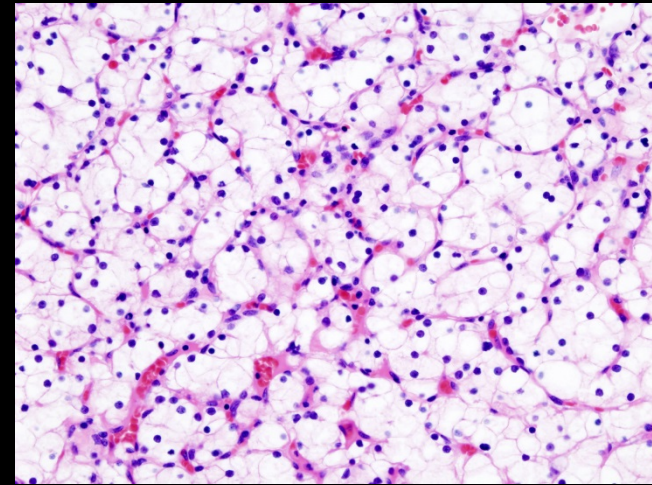
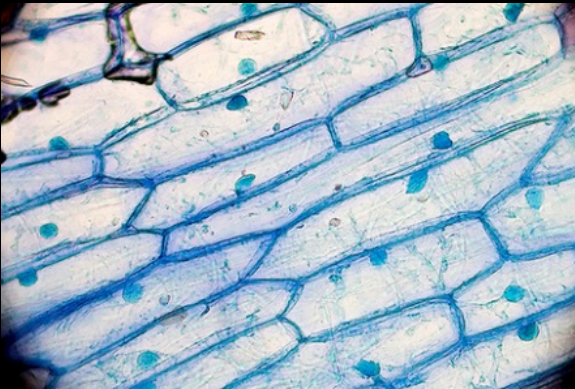
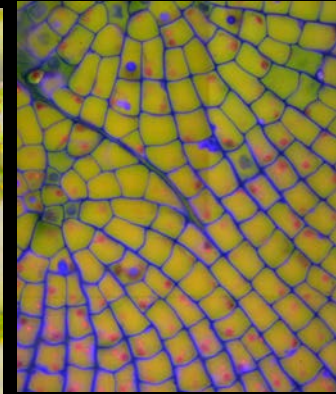
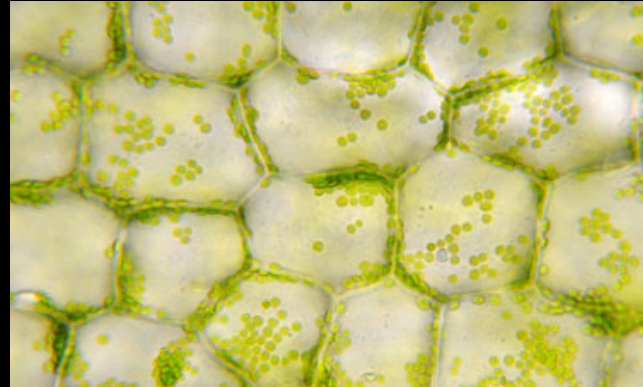
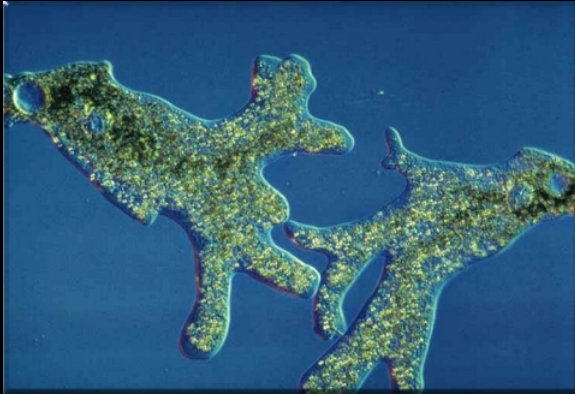
- Warm-up question:
 - Choose an object in the room.
 - What does the object do, or what is it for?
 - How is the structure of the object related to its function?

Cell Structures

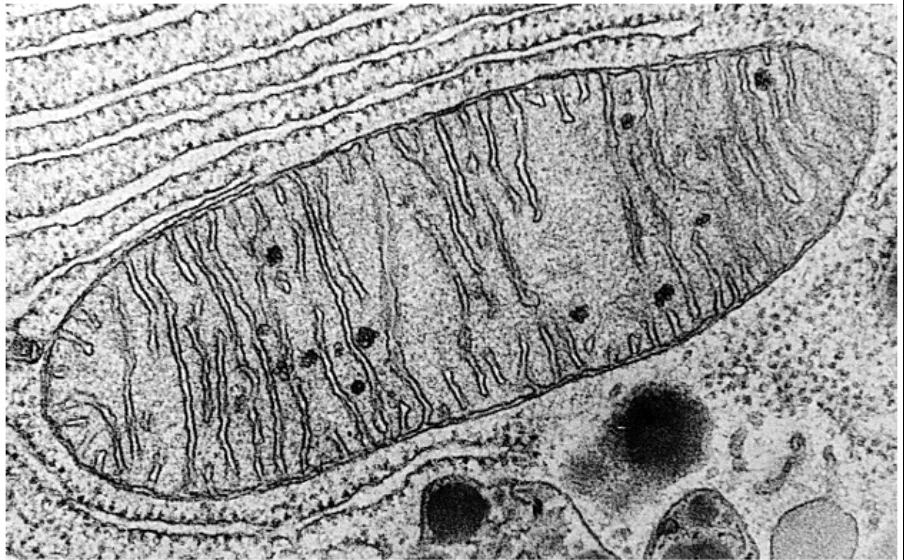
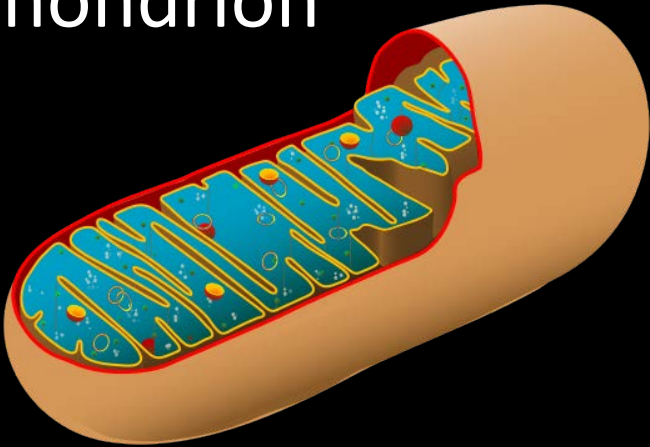
<http://htwins.net/scale2/>



What might a cell need?

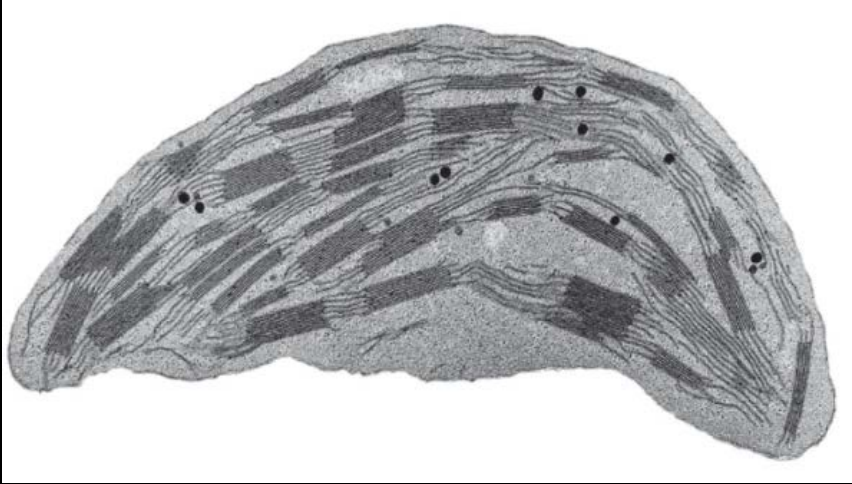
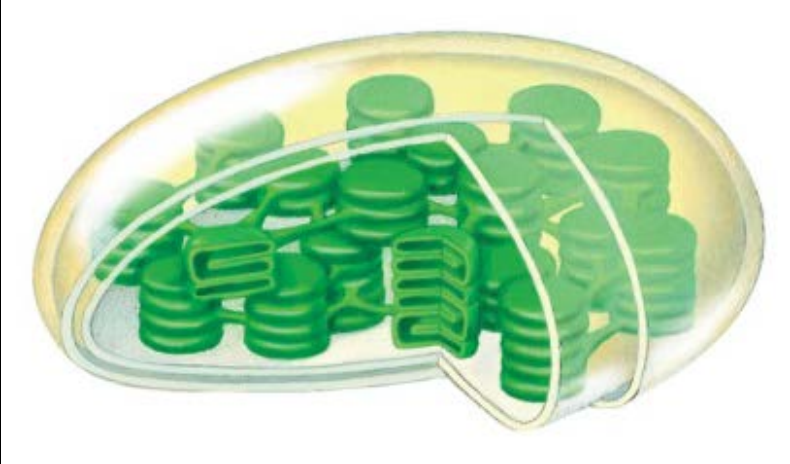





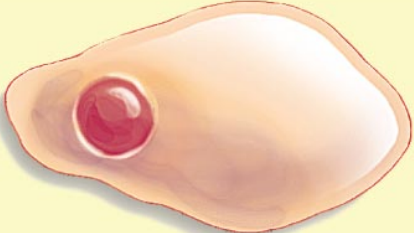

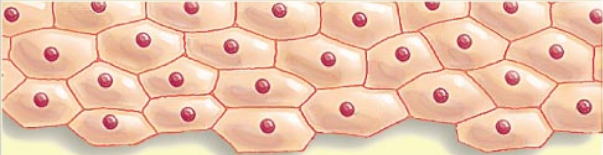

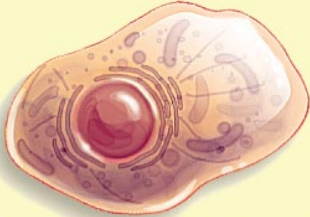
Mitochondrion



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Chloroplast



	Prokaryotic cells	Eukaryotic cells
DNA	 <p>spread through much of cell</p>	 <p>within membrane-bound nucleus</p>
Size	 <p>much smaller</p>	 <p>much larger</p>
Organization	 <p>always single-celled</p>	 <p>often multicellular</p>
Organelles	 <p>only one type of organelle</p>	 <p>many types of organelles</p>

**(a) Bacteria on a pin,
magnified x 85**



(b) Magnified x 425

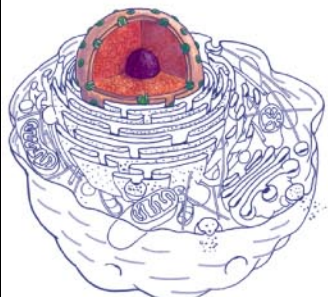


(c) Magnified x 2100

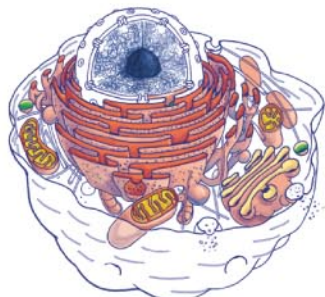


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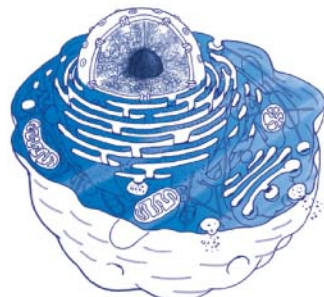
Components of eukaryotic cells



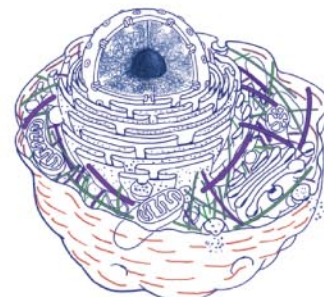
nucleus



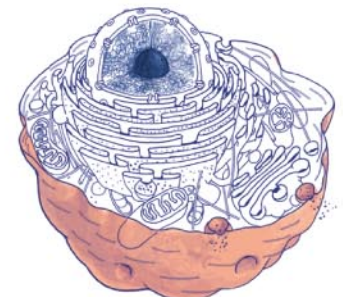
other organelles



cytosol



cytoskeleton



plasma membrane

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Fig. 4.3

The nucleus contains the cell's primary complement of DNA.

nuclear pores
DNA
nuclear envelope
nucleolus

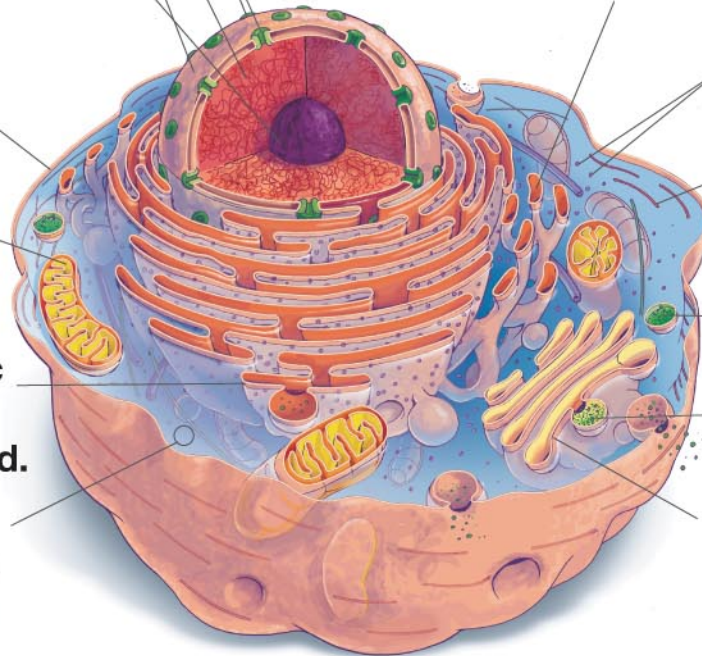
The smooth endoplasmic reticulum is the site of the production of lipid molecules such as estrogen and testosterone.

plasma membrane

Mitochondria are the powerplant organelles that extract energy from food and put it into a form cells can use.

The folds of the rough endoplasmic reticulum form a set of chambers within which proteins are processed.

All the cell's structures outside the nucleus are immersed in a jelly-like fluid called the cytosol. Composed mostly of water, the cytosol is a location for countless chemical reactions carried out within the cell.



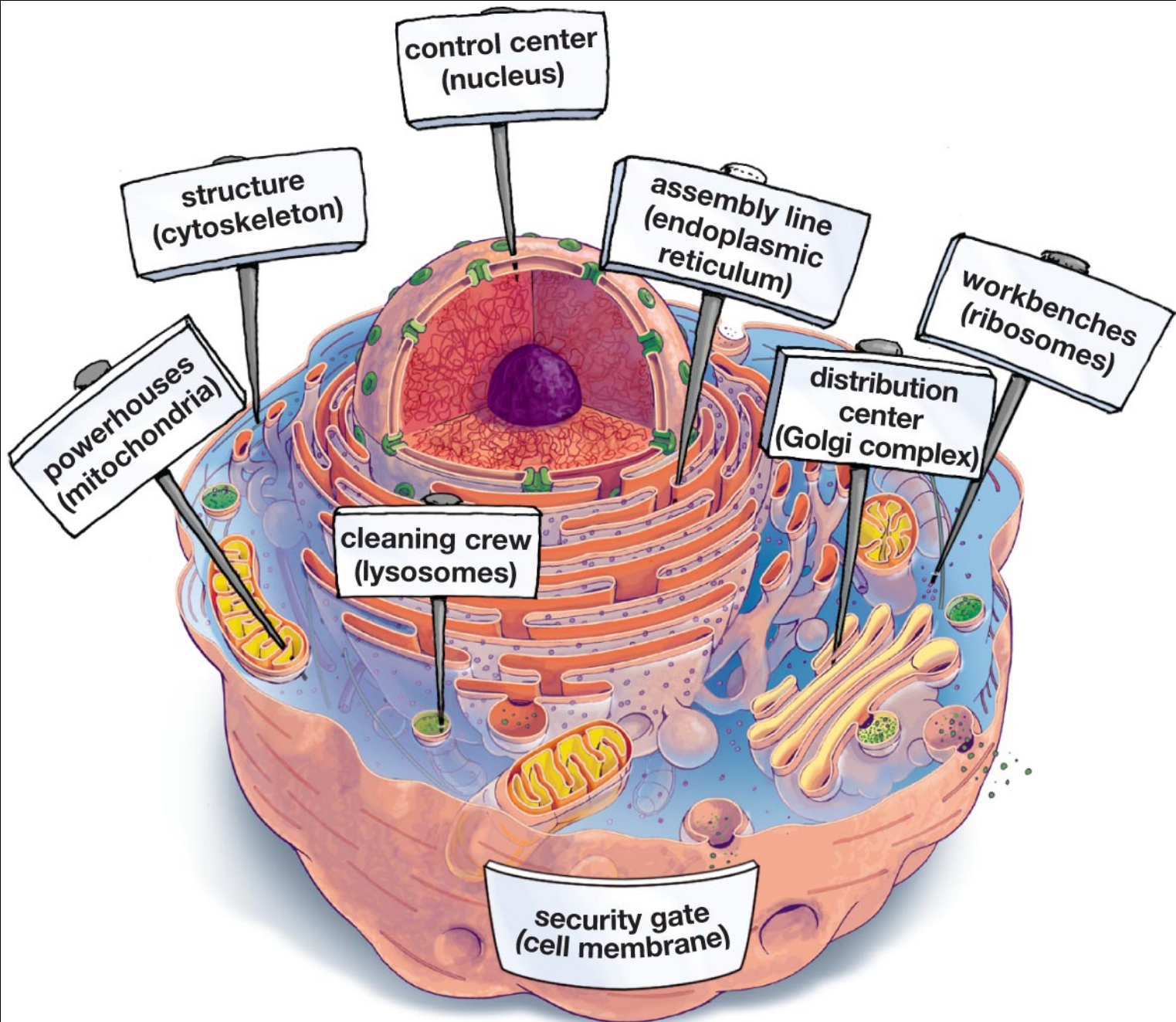
free ribosomes

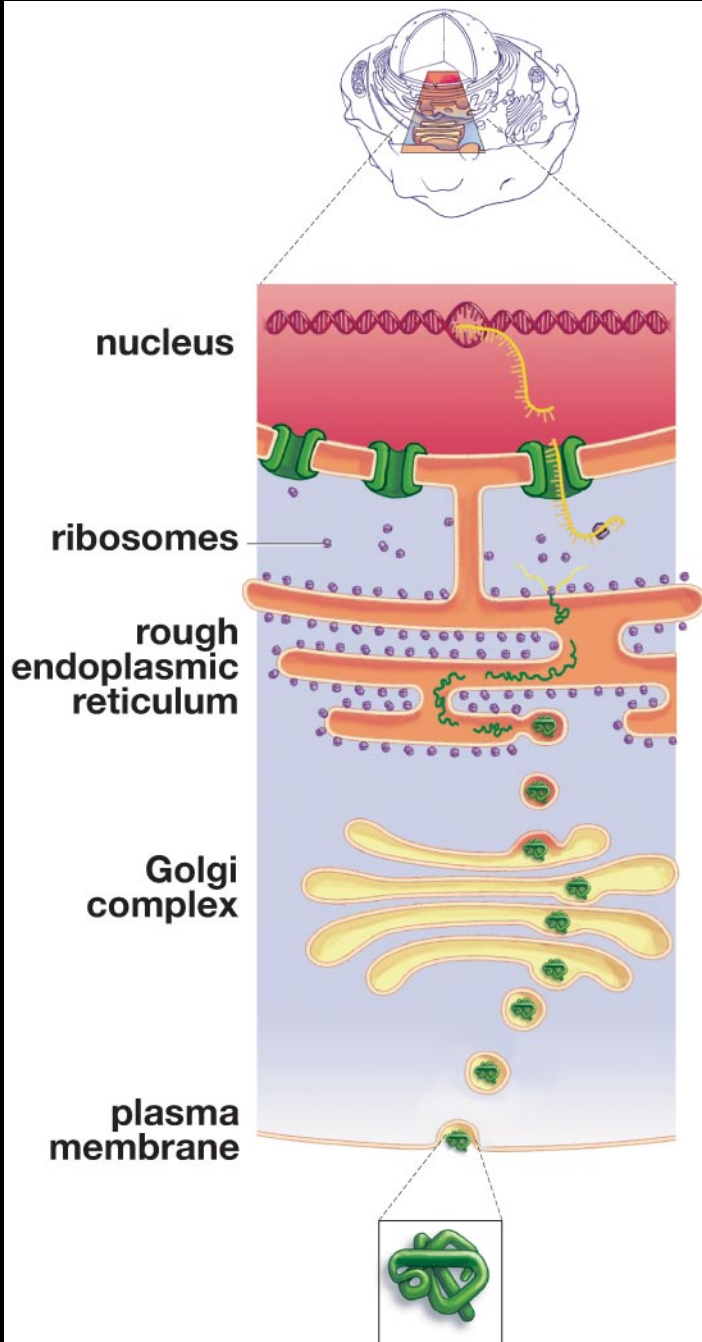
cytoskeleton

lysosome

transport vesicle

How are cell proteins sorted and shipped, so that they end up at the right location? Partly through the work of the Golgi complex.





1. Instructions from DNA are copied onto mRNA.

2. mRNA moves to ribosome.

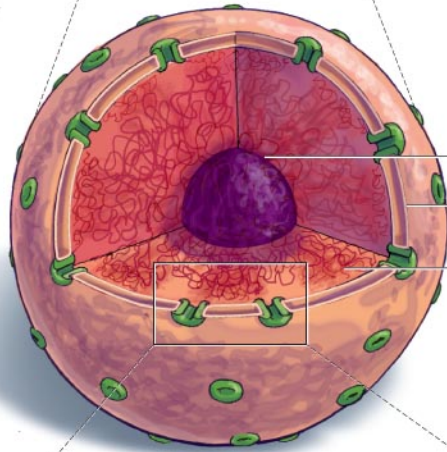
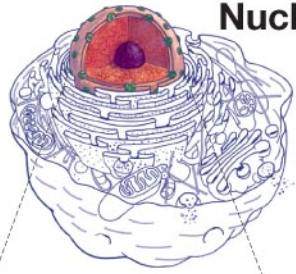
3. Ribosome moves to endoplasmic reticulum and "reads" mRNA instructions.

4. Amino acid chain growing from ribosome is dropped inside endoplasmic reticulum membrane. Chain folds into protein.

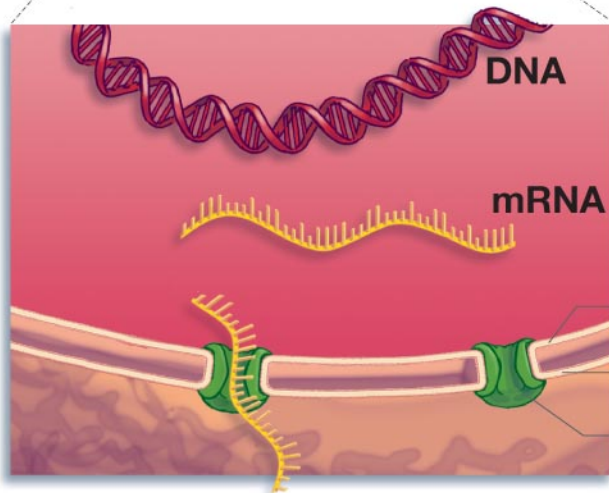
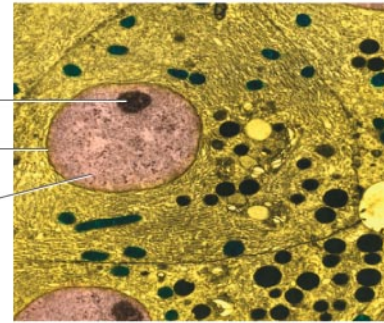
5. Protein moves to Golgi complex for additional processing and for sorting.

6. Protein moves to plasma membrane for export.

Nucleus



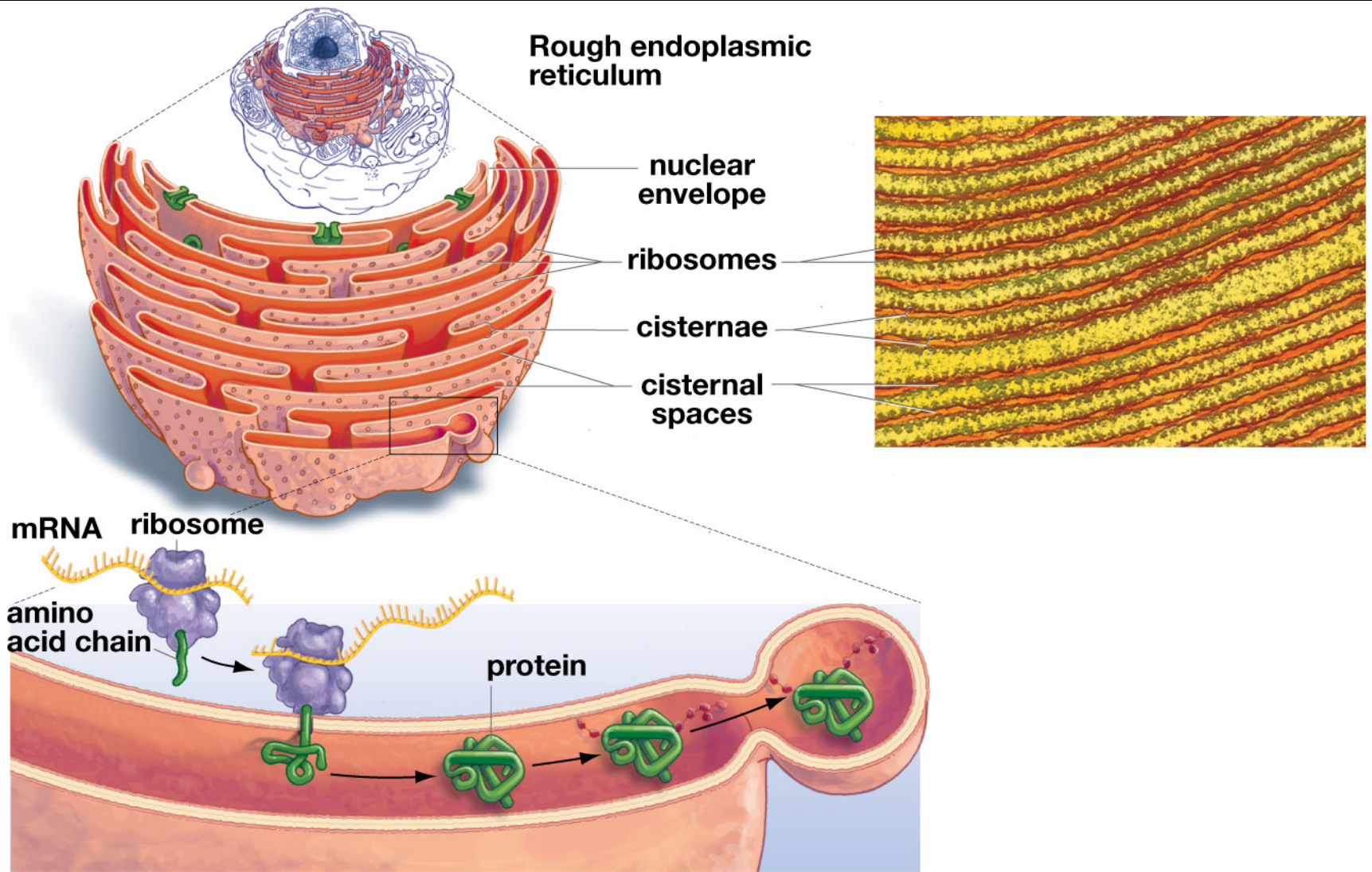
nucleolus
nuclear
envelope
DNA



DNA

mRNA

inner membrane }
outer membrane } nuclear envelope
nuclear pore }



1. mRNA docks on ribosome. Amino acid chain production begins.

2. Ribosome docks on ER. As it is completed, amino acid chain moves into ER's internal space.

3. Amino acid chain folds up making a protein.

4. Sugar side chains added to protein.

5. Vesicle formed to house protein while in transport.

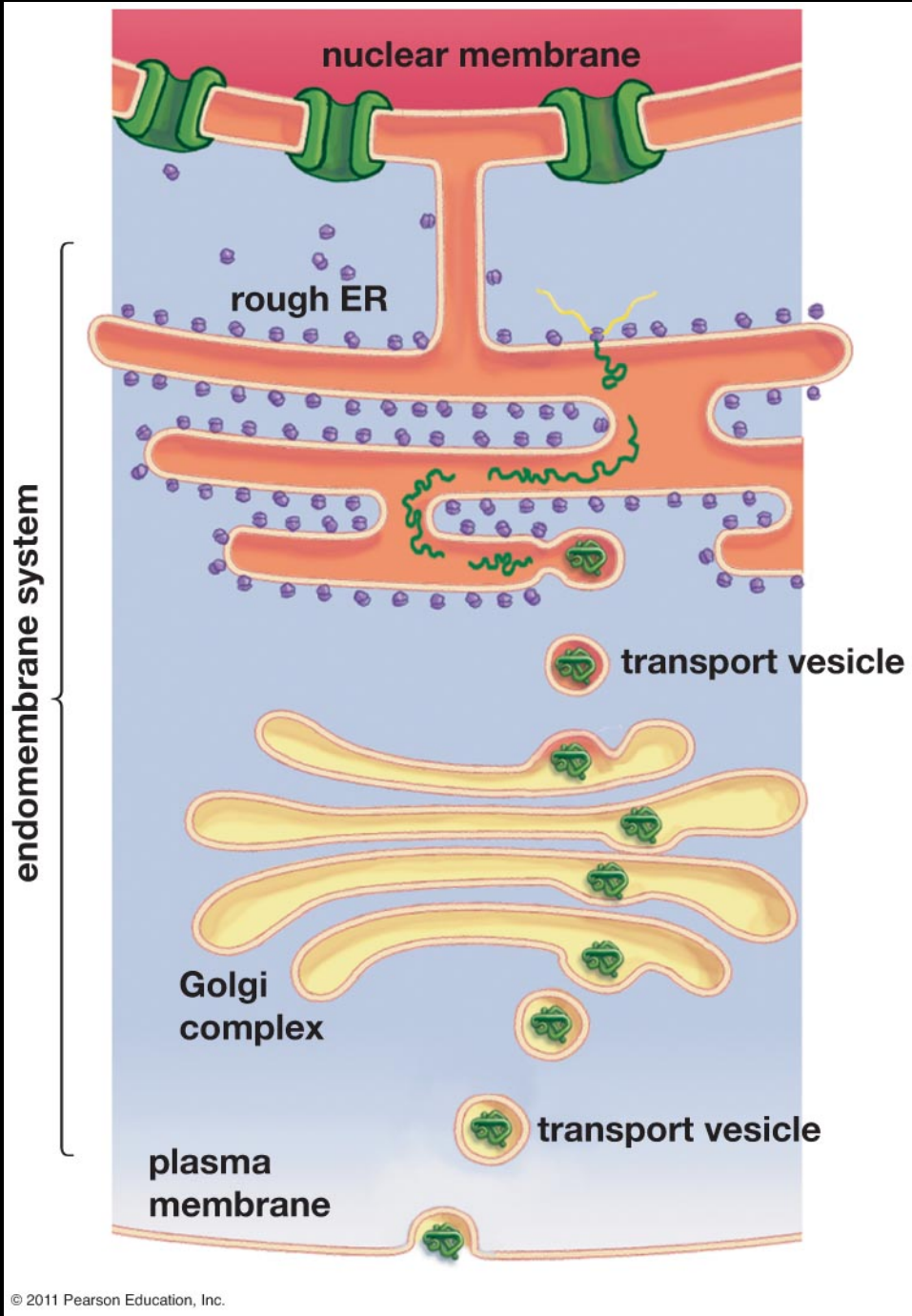


Fig. 4.8

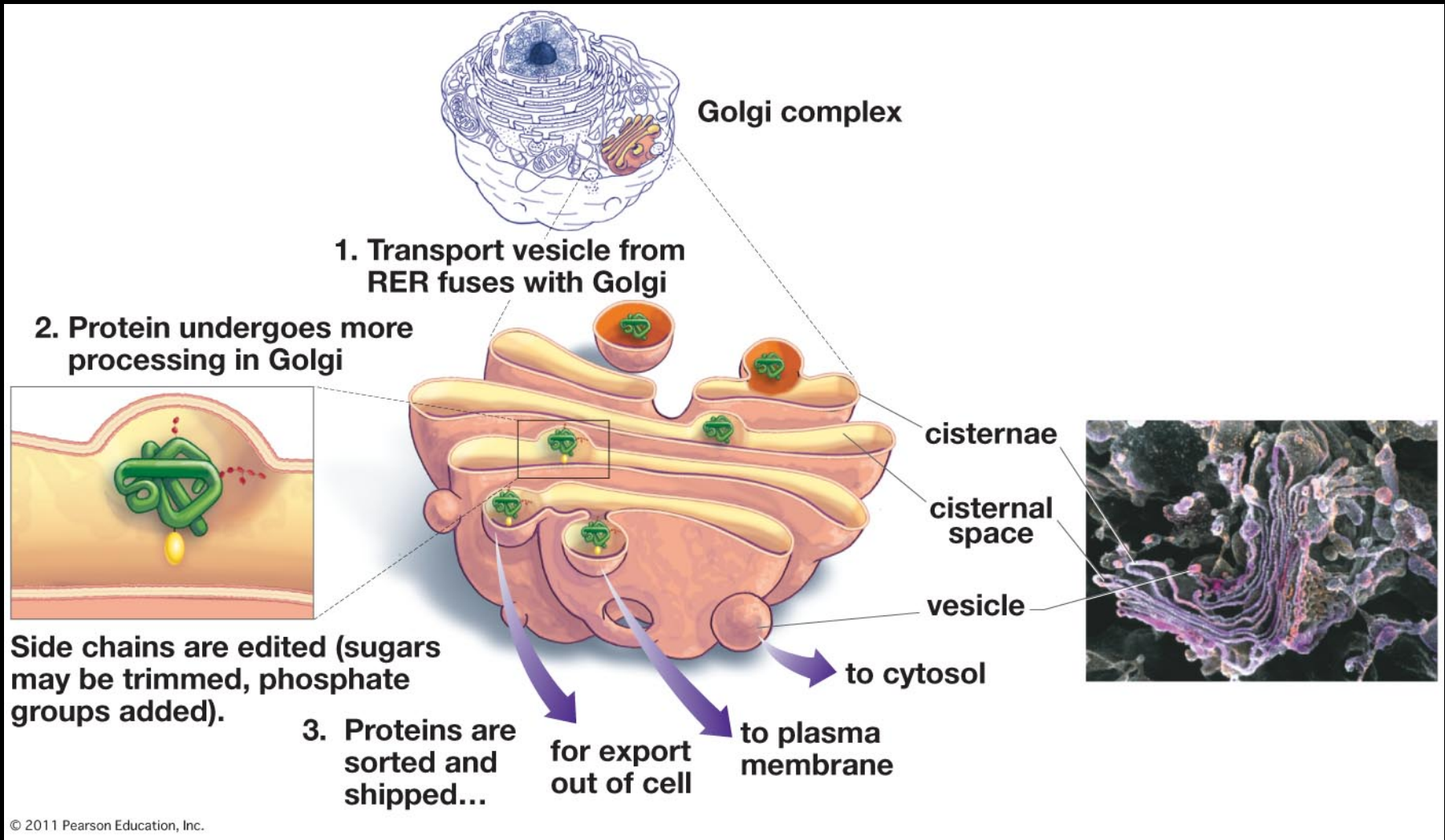


Fig. 4.9

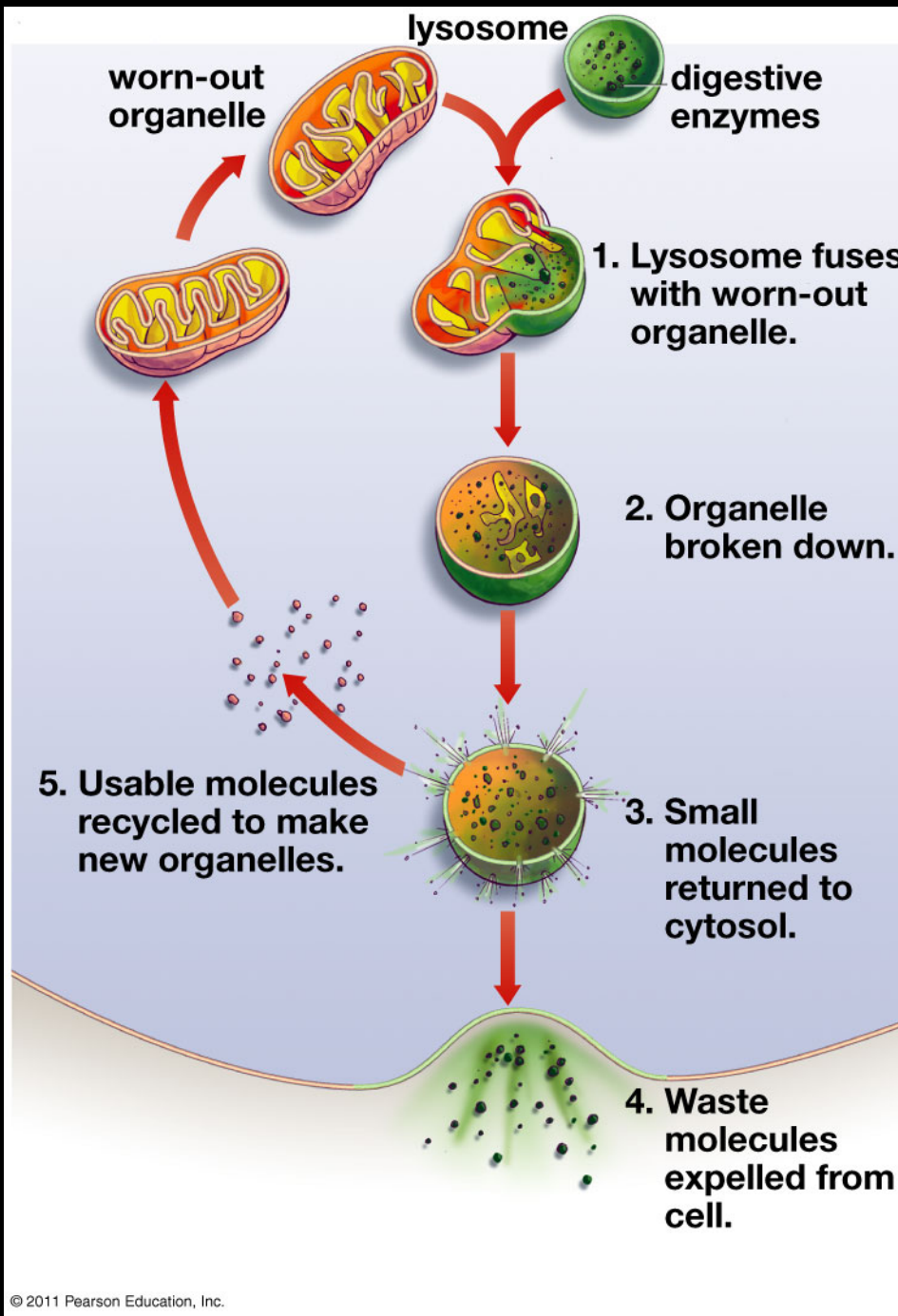


Fig. 4.10

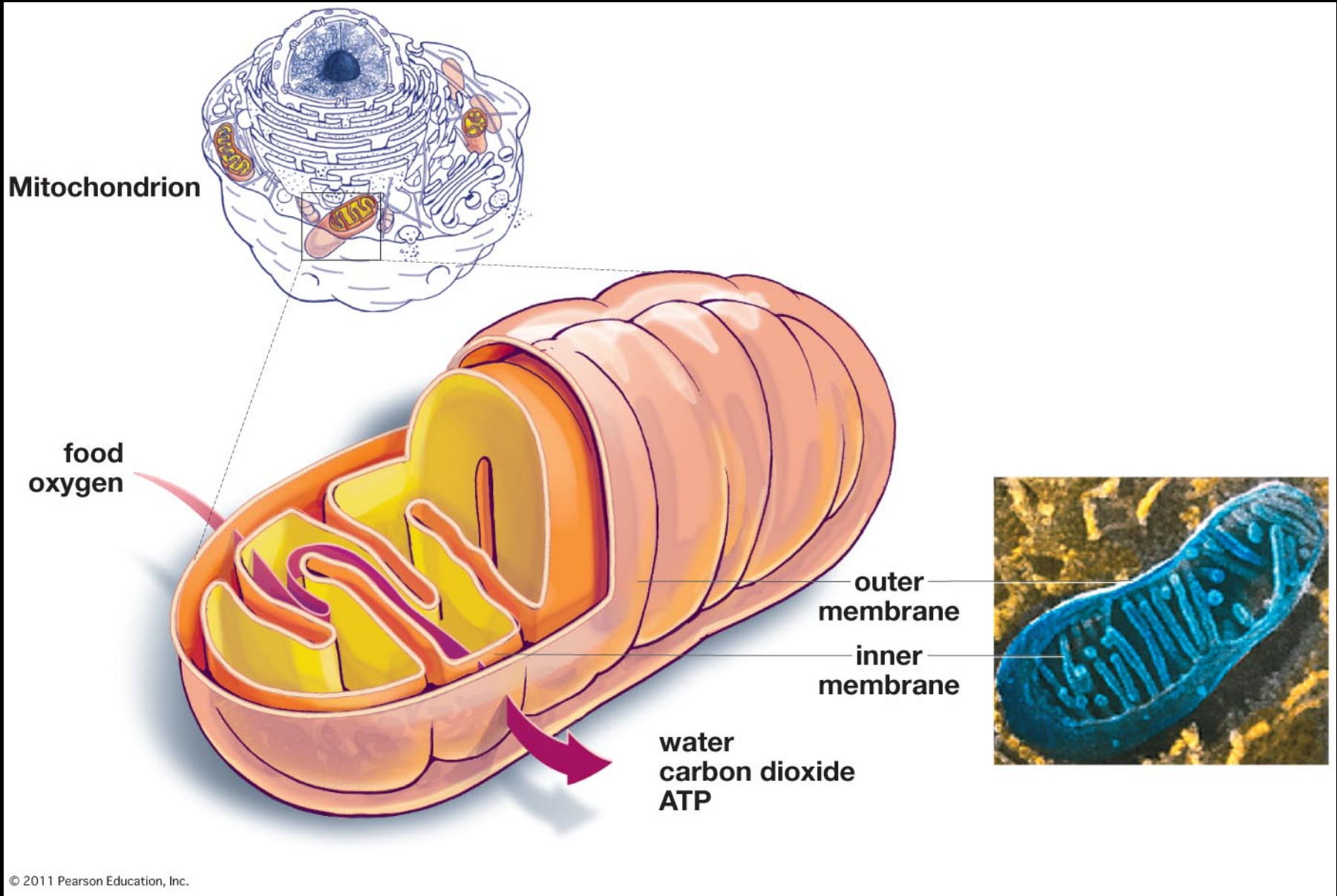


Fig. 4.11

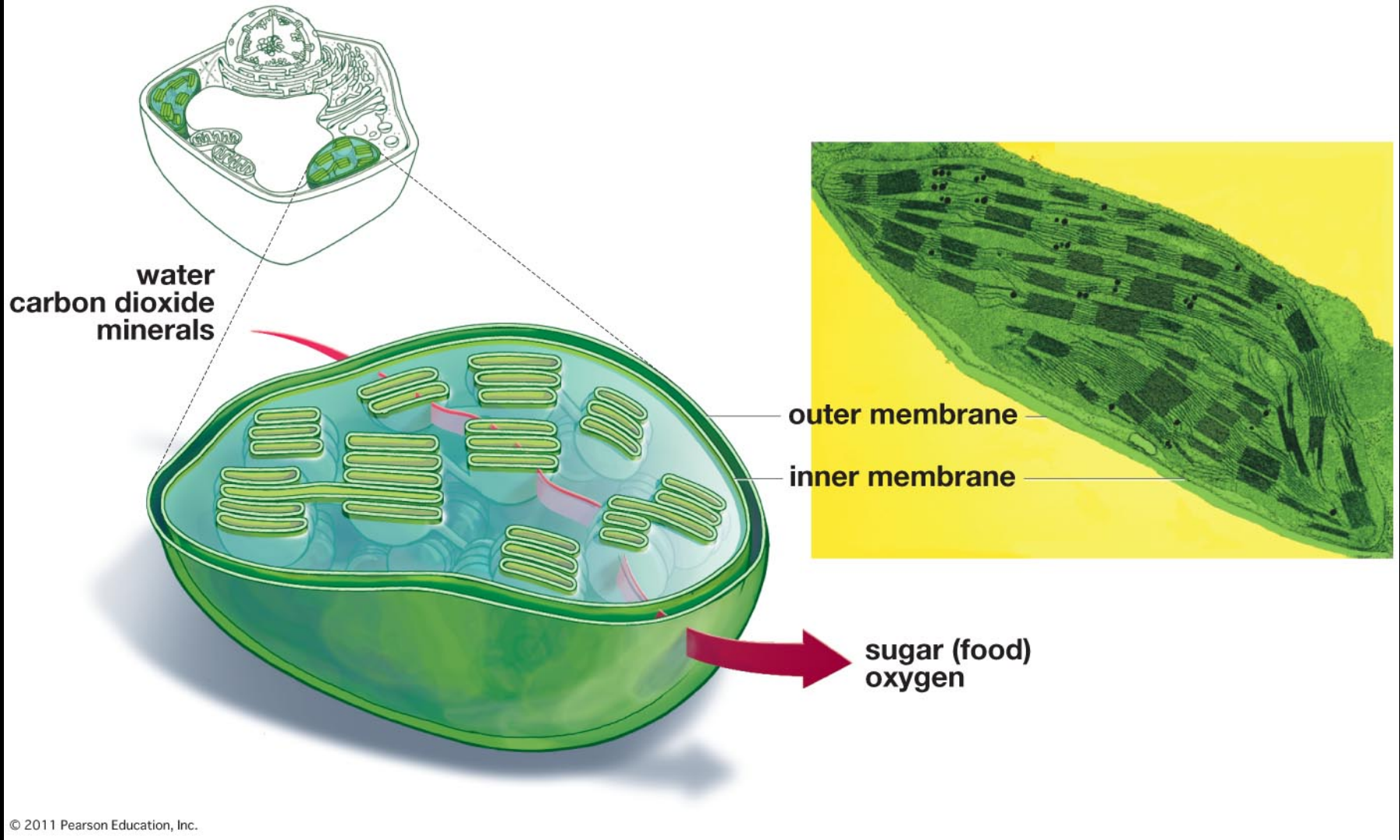
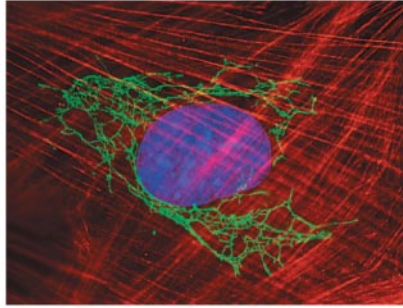
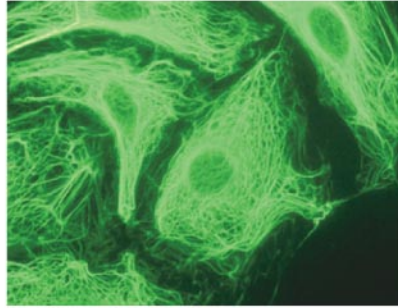


Fig. 4.19

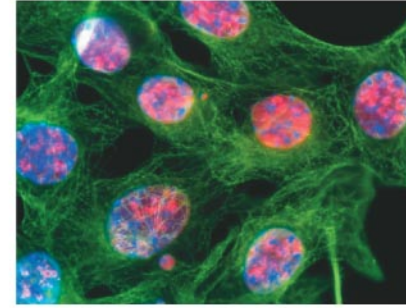
(a) Microfilaments (in red)



(b) Intermediate filaments



(c) Microtubules



7 nm []

Main function: changes in cell shape

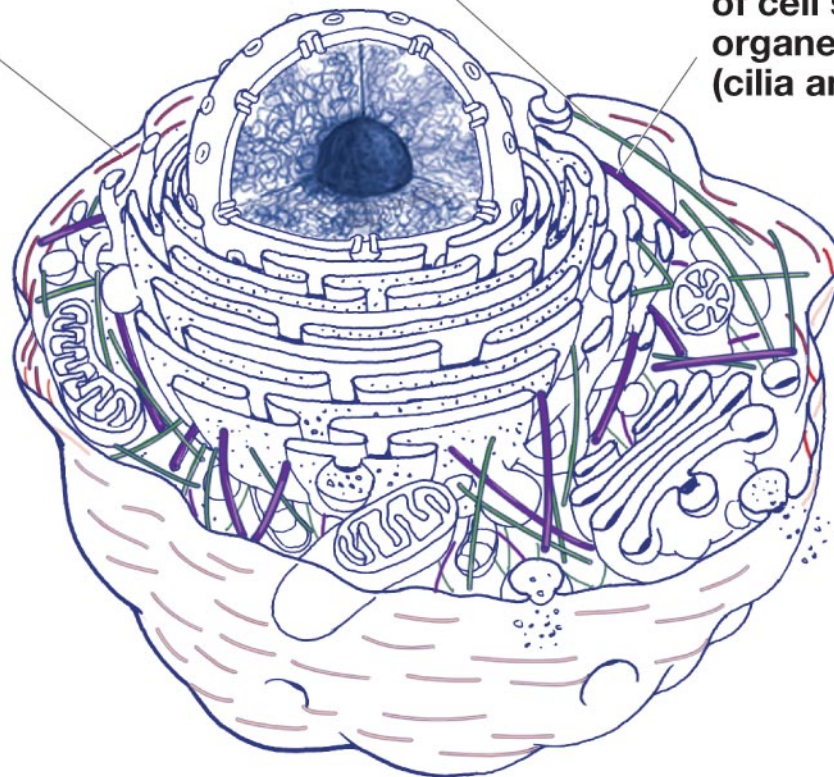
10 nm []

Main function: maintenance of cell shape

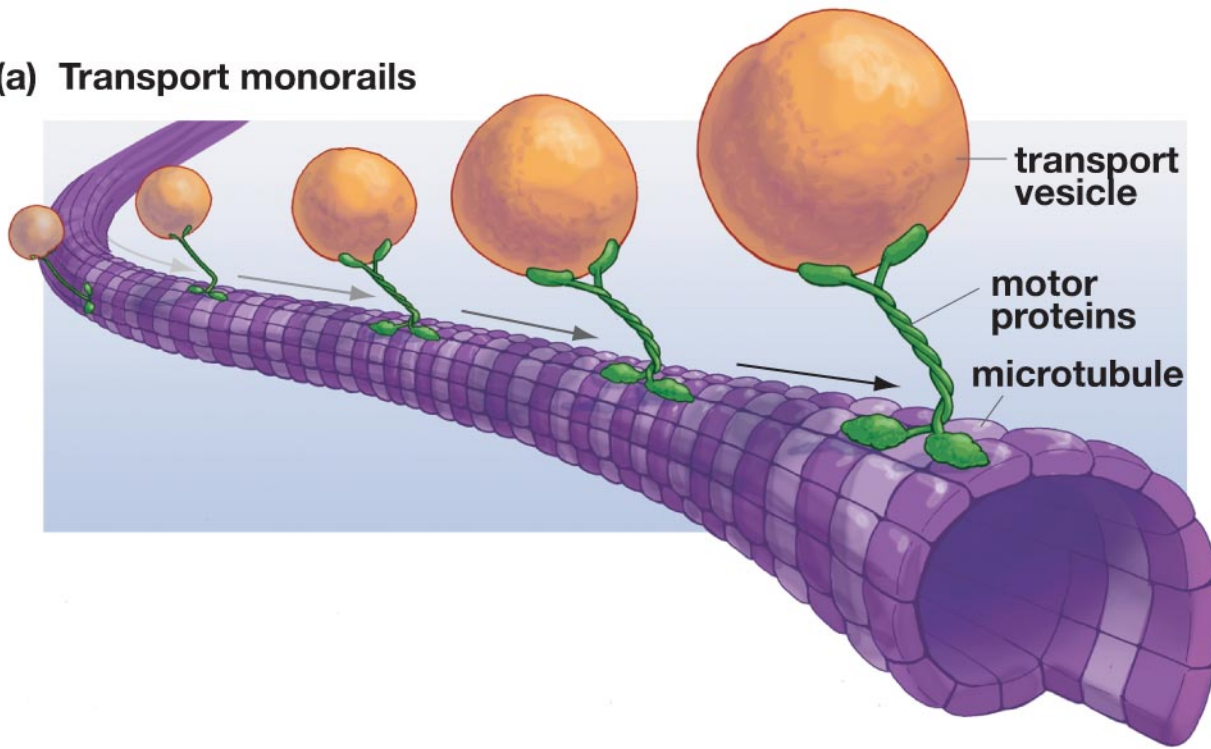


25 nm []

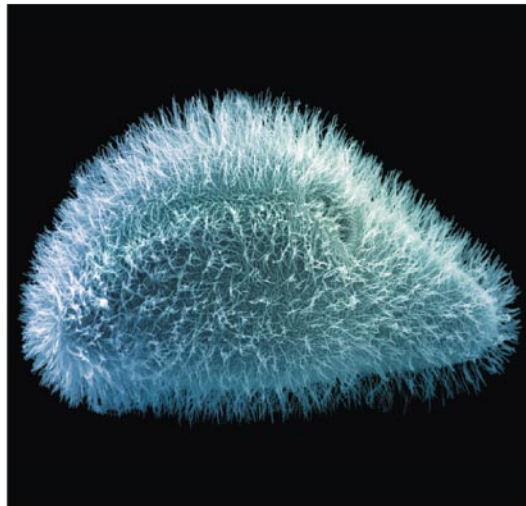
Main functions: maintenance of cell shape, movement of organelles, cell mobility (cilia and flagella)



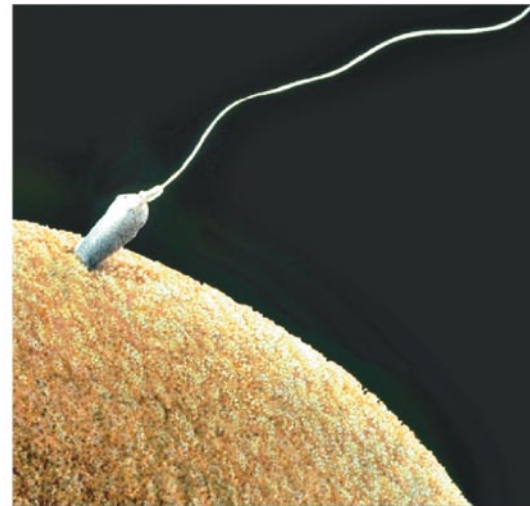
(a) Transport monorails

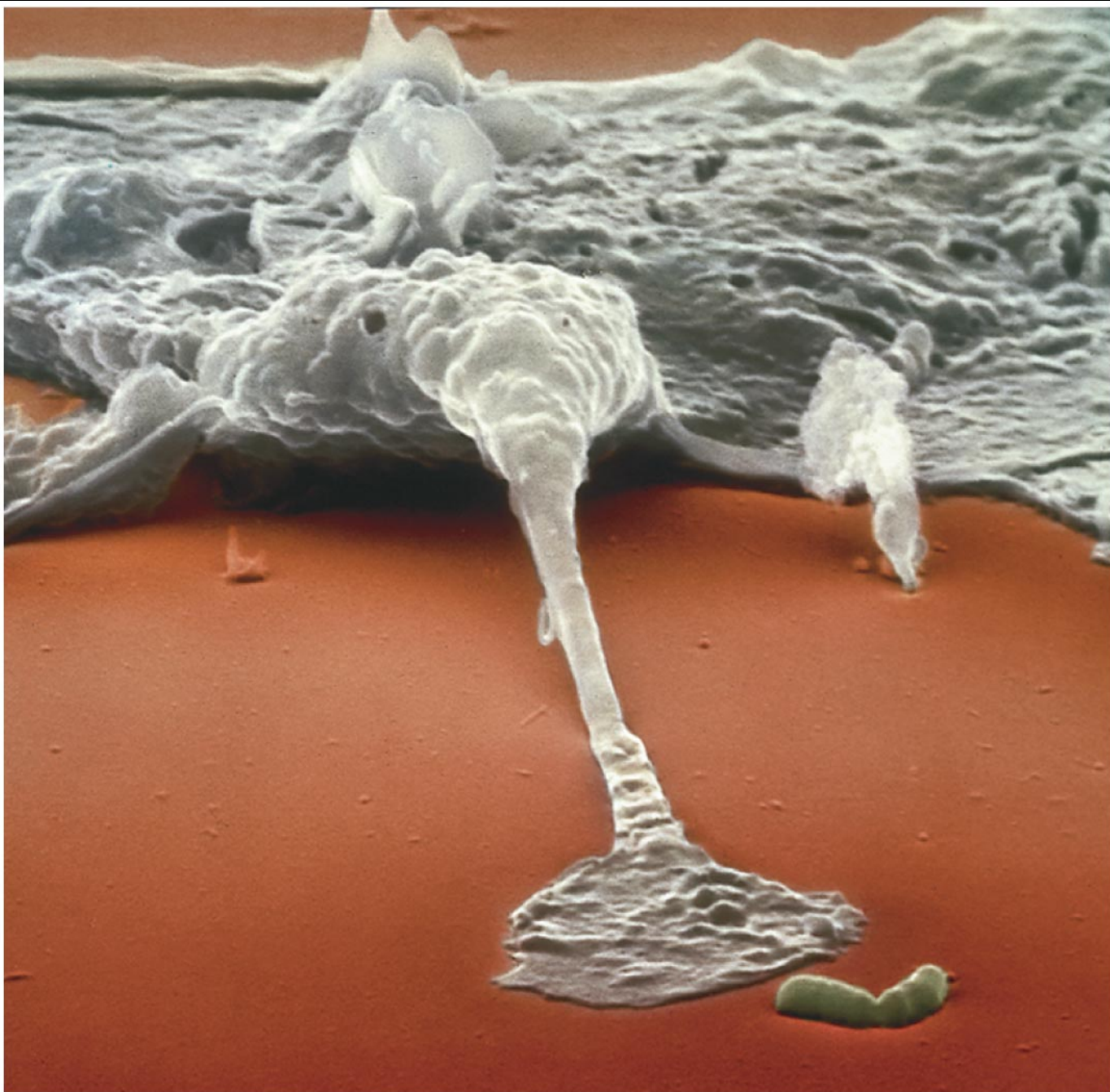


(b) Cilia



(c) Flagellum





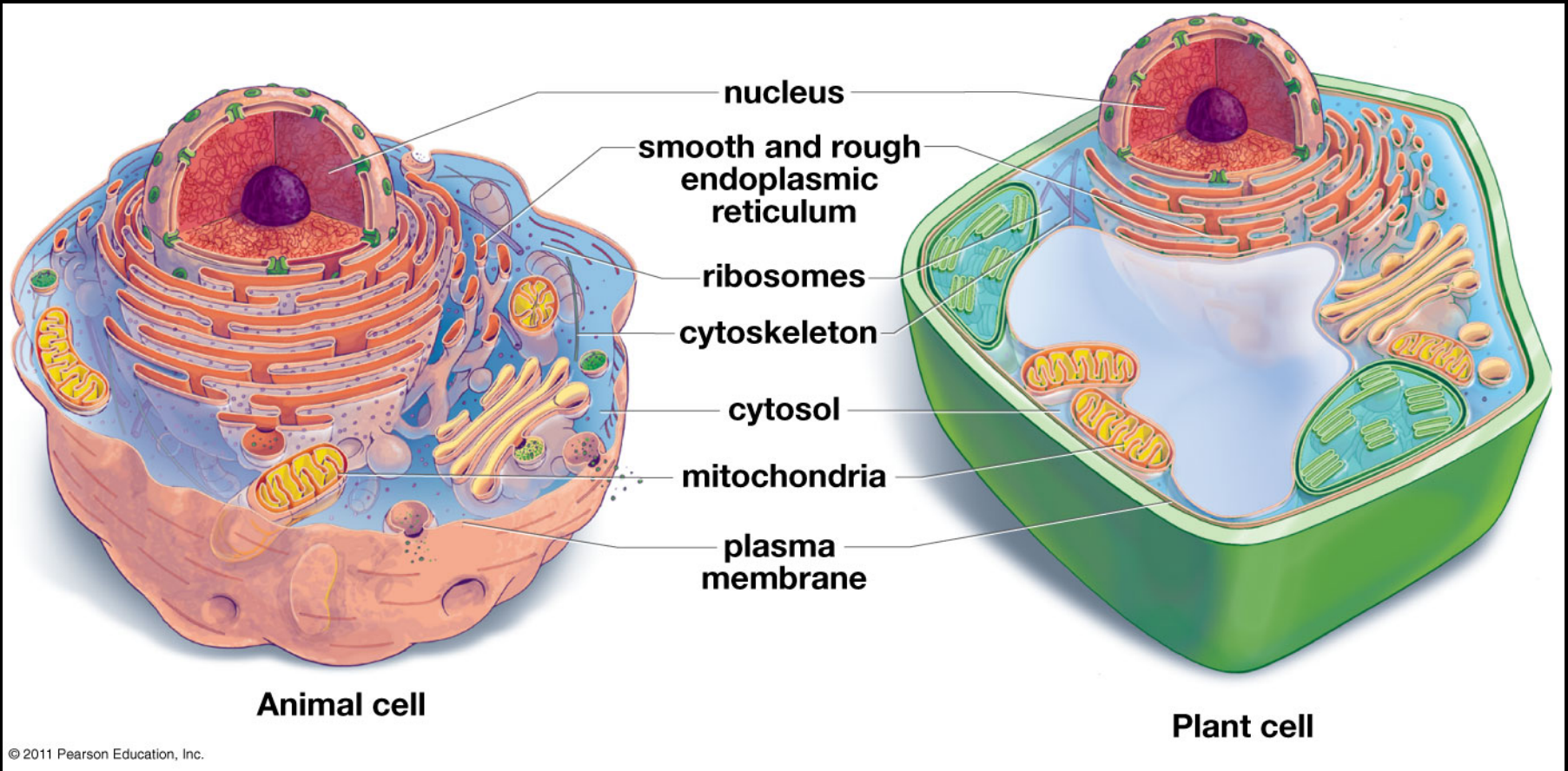


Fig. 4.16

Plant cells have a cell wall, chloroplasts, and a central vacuole, while animal cells do not.



cytoskeleton

cell wall

chloroplast

central vacuole

nuclear envelope

nuclear pores

DNA

nucleolus

nucleus

rough endoplasmic reticulum

smooth endoplasmic reticulum

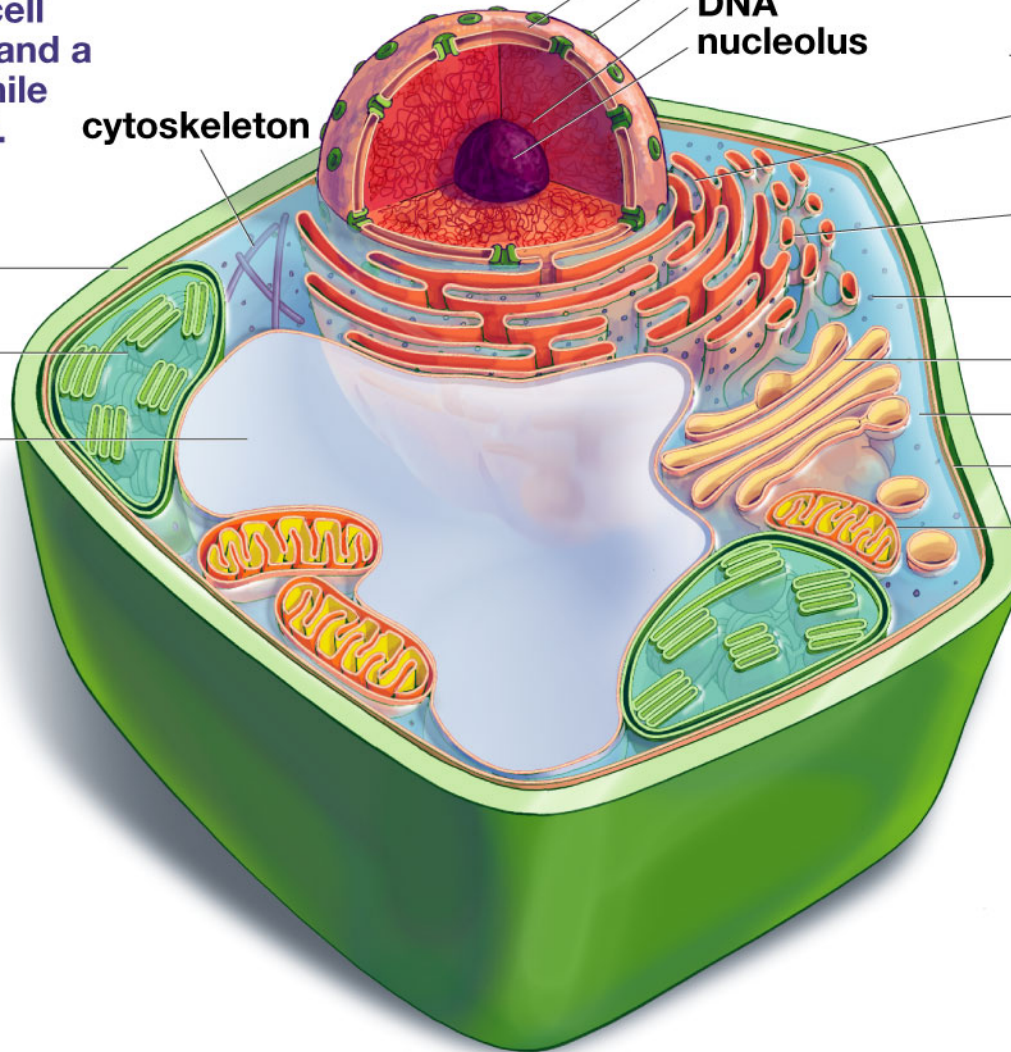
free ribosomes

Golgi complex

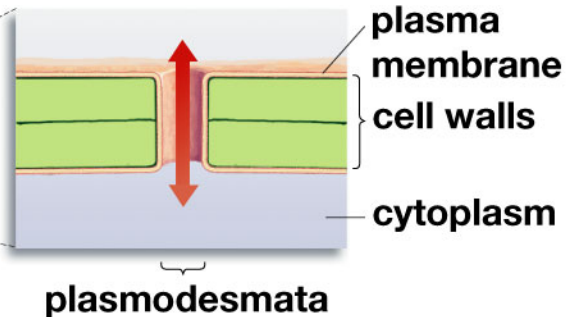
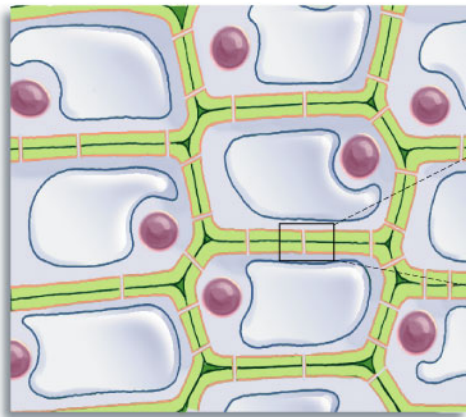
cytosol

plasma membrane

mitochondrion



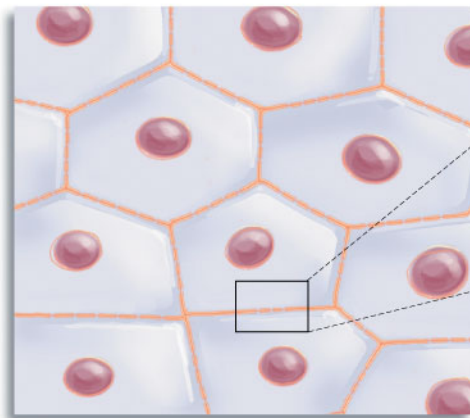
Plant tissues



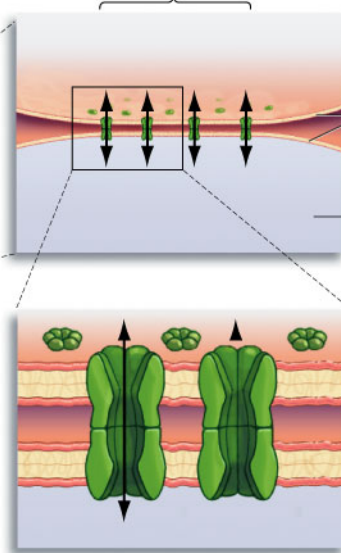
(a) Plasmodesmata

In plants, a series of tiny pores between plant cells, the plasmodesmata, allow for the movement of materials among cells. Thanks to the plasmodesmata channels, the cytoplasm of one cell is continuous with the cytoplasm of the next; the plant as a whole can be thought of as having a single complement of continuous cytoplasm.

Animal tissues



gap junction



plasma
membranes
cytoplasm

(b) Gap junctions

In animals, protein assemblies come into alignment with one another, forming communication channels between cells. A cluster of many such assemblies—perhaps several hundred—is called a gap junction.

